
SECTION 15122 - METERS AND GAGES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes meters and gages for mechanical systems and water meters installed outside the building.
 - 1. Mechanical equipment Sections that specify meters and gages as part of factory-fabricated equipment.

1.3 SUBMITTALS

- A. Product Data: Include scale range, ratings, and calibrated performance curves for each meter, gage, fitting, specialty, and accessory specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Liquid-in-Glass Thermometers:
 - a. Dresser Industries, Inc.; Instrument Div.; Weksler Instruments Operating Unit.
 - b. Ernst Gage Co.
 - c. Marsh Bellofram.
 - d. Palmer Instruments, Inc.
 - e. Terice: H. O. Terice Co.

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- f. Weiss Instruments, Inc.
 - g. Winter's Thermogauges, Inc.
2. Bimetal Dial Thermometers:
- a. Dresser Industries, Inc.; Instrument Div.; Ashcroft Commercial Sales Operation.
 - b. Dresser Industries, Inc.; Instrument Div.; Weksler Instruments Operating Unit.
 - c. Ernst Gage Co.
 - d. Marsh Bellofram.
 - e. Noshok, Inc.
 - f. Reotemp Instrument Corp.
 - g. Tel-Tru Manufacturing Co., Inc.
 - h. Trerice: H. O. Trerice Co.
 - i. Weiss Instruments, Inc.
 - j. Winter's Thermogauges, Inc.
3. Insertion Dial Thermometers:
- a. Dresser Industries, Inc.; Instrument Div.; Ashcroft Commercial Sales Operation.
 - b. Dresser Industries, Inc.; Instrument Div.; Weksler Instruments Operating Unit.
 - c. Reotemp Instrument Corp.
 - d. Tel-Tru Manufacturing Co., Inc.
 - e. Trerice: H. O. Trerice Co.
 - f. Weiss Instruments, Inc.
4. Pressure Gages:
- a. AMETEK, Inc.; U.S. Gauge Div.
 - b. Dresser Industries, Inc.; Instrument Div.; Ashcroft Commercial Sales Operation.
 - c. Dresser Industries, Inc.; Instrument Div.; Weksler Instruments Operating Unit.
 - d. Ernst Gage Co.
 - e. Marsh Bellofram.
 - f. Noshok, Inc.
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- g. Terice: H. O. Terice Co.
 - h. Weiss Instruments, Inc.
 - i. WKA Instruments Corp.
 - j. Winter's Thermogauges, Inc.

- 5. Test Plugs:
 - a. Flow Design, Inc.
 - b. MG Piping Products Co.
 - c. National Meter.
 - d. Peterson Equipment Co., Inc.
 - e. Sisco Manufacturing Co.
 - f. Terice: H. O. Terice Co.
 - g. Watts Industries, Inc.; Water Products Div.

2.2 THERMOMETERS, GENERAL

- A. Scale Range: Temperature ranges for services listed are as follows:
 - 1. Domestic Hot Water: 30 to 240 deg F, with 2-degree scale divisions (0 to 115 deg C, with 1-degree scale divisions).
 - 2. Domestic Cold Water: 0 to 100 deg F, with 2-degree scale divisions (minus 18 to plus 38 deg C, with 1-degree scale divisions).
 - 3. Hot Water: 30 to 300 deg F, with 2-degree scale divisions (0 to 150 deg C, with 1-degree scale divisions).
 - 4. Chilled Water: 0 to 100 deg F, with 2-degree scale divisions (minus 18 to plus 38 deg C, with 1-degree scale divisions).
- B. Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.

2.3 LIQUID-IN-GLASS THERMOMETERS

- A. Description: ASTM E 1.
 - B. Case: Die cast and aluminum finished in baked-epoxy enamel, glass front, spring secured, 9 inches (230 mm) long.
 - C. Adjustable Joint: Finish to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.
 - D. Tube: Red or blue reading, mercury filled with magnifying lens.
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- E. Scale: Satin-faced nonreflective aluminum with permanently etched markings.
 - F. Stem: Copper-plated steel, aluminum, or brass for separable socket; of length to suit installation.

2.4 BIMETAL DIAL THERMOMETERS

- A. Description: ASME B40.3; direct-mounting, universal-angle dial type.
- B. Case: Stainless steel with 5-inch- (125-mm-) diameter, glass lens.
- C. Adjustable Joint: Finish to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.
- D. Element: Bimetal coil.
- E. Scale: Satin-faced nonreflective aluminum with permanently etched markings.
- F. Stem: Stainless steel for separable socket, of length to suit installation.

2.5 INSERTION DIAL THERMOMETERS

- A. Description: ASME B40.3, bimetal type.
- B. Dial: 1-inch (25-mm) diameter.
- C. Case: Stainless steel.
- D. Stem: Dustproof and leakproof 1/8-inch- (3-mm-) diameter, tapered-end stem with nominal length of 5 inches (125 mm).

2.6 SEPARABLE SOCKETS

- A. Description: Fitting with protective socket for installation in threaded pipe fitting to hold fixed thermometer stem.
 - 1. Material: Brass, for use in copper piping.
 - 2. Material: Steel, for use in steel piping.
 - 3. Extension-Neck Length: Nominal thickness of 2 inches (50 mm), but not less than thickness of insulation. Omit extension neck for sockets for piping not insulated.
 - 4. Insertion Length: To extend to one-third of diameter of pipe.
 - 5. Cap: Threaded, with chain permanently fastened to socket.
 - 6. Heat-Transfer Fluid: Oil or graphite.

2.7 THERMOMETER WELLS

- A. Description: Fitting with protective well for installation in threaded pipe fitting to hold test thermometer.
1. Material: Brass, for use in copper piping.
 2. Material: Steel, for use in steel piping.
 3. Extension-Neck Length: Nominal thickness of 2 inches (50 mm), but not less than thickness of insulation. Omit extension neck for wells for piping not insulated.
 4. Insertion Length: To extend to one-third of diameter of pipe.
 5. Cap: Threaded, with chain permanently fastened to socket.
 6. Heat-Transfer Fluid: Oil or graphite.

2.8 DUCT THERMOMETER SUPPORT FLANGES

- A. Description: Flanged-fitting bracket for mounting in hole of duct, with threaded end for attaching thermometer.
1. Extension-Neck Length: Nominal thickness of 2 inches (50 mm), but not less than thickness of exterior insulation.

2.9 PRESSURE GAGES

- A. Description: ASME B40.1, phosphor-bronze bourdon-tube type with bottom connection; dry type, unless liquid-filled-case type is indicated.
- B. Case: Drawn steel, brass, or aluminum with 4-1/2-inch- (115-mm-) diameter, glass lens.
- C. Connector: Brass, NPS 1/4 (DN8).
- D. Scale: White-coated aluminum with permanently etched markings.
- E. Accuracy: Grade B, plus or minus 2 percent of middle 50 percent of scale.
- F. Range: Comply with the following:
1. Fluids under Pressure: Two times the operating pressure.

2.10 PRESSURE-GAGE FITTINGS

- A. Valves: NPS 1/4 (DN8) brass or stainless-steel needle type.
- B. Syphons: NPS 1/4 (DN8) coil of brass tubing with threaded ends.

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- C. Snubbers: ASME B40.5, NPS 1/4 (DN8) brass bushing with corrosion-resistant porous-metal disc of material suitable for system fluid and working pressure.

2.11 TEST PLUGS

- A. Description: Nickel-plated, brass-body test plug in NPS 1/2 (DN15) fitting.
- B. Body: Length as required to extend beyond insulation.
- C. Pressure Rating: 500 psig (3450 kPa) minimum.
- D. Core Inserts: One or two self-sealing valves, suitable for inserting 1/8-inch (3-mm) OD probe from dial-type thermometer or pressure gage.
- E. Core Material for Air and Water: Minus 30 to plus 275 deg F (Minus 35 to plus 136 deg C), ethylene-propylene-diene terpolymer rubber.
- F. Test-Plug Cap: Gasketed and threaded cap, with retention chain or strap.
- G. Test Kit: Pressure gage and adapter with probe, two bimetal dial thermometers, and carrying case.
 - 1. Pressure Gage and Thermometer Ranges: Approximately two times the system's operating conditions.

PART 3 - EXECUTION

3.1 METER AND GAGE INSTALLATION, GENERAL

- A. Install meters, gages, and accessories according to manufacturer's written instructions for applications where used.

3.2 THERMOMETER INSTALLATION

- A. Install thermometers and adjust vertical and tilted positions.
- B. Install in the following locations:
 - 1. Inlet and outlet of each hydronic zone.
 - 2. Inlet and outlet of each hydronic chiller.
 - 3. Inlet and outlet of each hydronic coil in air-handling units.
 - 4. Outside-air, return-air, and mixed-air ducts.
 - 5. Each duct thermometer support flange.

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- C. Install separable sockets in vertical position in piping tees where fixed thermometers are indicated.
 - 1. Install with socket extending to one-third of diameter of pipe.
 - 2. Fill sockets with oil or graphite and secure caps.
 - D. Install thermometer wells in vertical position in piping tees where test thermometers are indicated.
 - 1. Install with stem extending to one-third of diameter of pipe.
 - 2. Fill wells with oil or graphite and secure caps.
 - E. Duct Thermometer Support Flanges: Install in wall of duct where duct thermometers are indicated. Attach to duct with screws.

3.3 PRESSURE-GAGE INSTALLATION

- A. Install pressure gages in piping tees with pressure-gage valve located on pipe at most readable position.
- B. Install dry-type pressure gages in the following locations:
 - 1. Chilled-water and condenser-water inlets and outlets of chillers.
- C. Install liquid-filled-type pressure gages at suction and discharge of each pump.
- D. Install pressure-gage needle valve and snubber in piping to pressure gages.
 - 1. Exception: Install syphon instead of snubber in piping to steam pressure gages.

3.4 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping and specialties. The following are specific connection requirements:
 - 1. Install meters and gages adjacent to machines and equipment to allow service and maintenance.

3.5 ADJUSTING AND CLEANING

- A. Calibrate meters according to manufacturer's written instructions, after installation.

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- B. Adjust faces of meters and gages to proper angle for best visibility.
 - C. Clean windows of meters and gages and clean factory-finished surfaces. Replace cracked and broken windows, and repair scratched and marred surfaces with manufacturer's touchup paint.

END OF SECTION 15122